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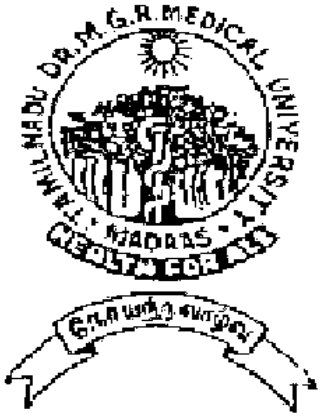

A STUDY ON EARLY ENTERAL FEEDING IN ENTEROCUTANEOUS FISTULA (IN POST OPERATIVE CASES)

Dissertation submitted

for

MASTER OF SURGERY (BRANCH I)
GENERAL SURGERY DEGREE EXAMINATION
MARCH 2009

CERTIFICATE

This is to certify that the dissertation entitled "**A STUDY ON EARLY ENTERAL FEEDING IN ENTEROCUTANEOUS FISTULA (IN POST OPERATIVE CASES)"** is a bonafide record of work done by **Dr.S.JEEVARAMAN.,** in the Department of Surgery, Government Rajaji Hospital, Madurai Medical College, Madurai., under the direct guidance of me.

Professor and HOD
Department of surgery,
Madurai Medical College and
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Madurai.

DEAN

Madurai Medical College and
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Madurai.

DECLARATION

I**, Dr.S.JEEVARAMAN** solemnly declare that the dissertation titled "**A STUDY ON EARLY ENTERAL FEEDING IN ENTEROCUTANEOUS FISTULA (IN POST OPERATIVE CASES)"** has been prepared by me. This is submitted to **The Tamil Nadu Dr. M.G.R. Medical University, Chennai,** in partial fulfillment of the regulations for the award of MS degree General Surgery.

Place: Madurai

Date: **Dr.S.JEEVARAMAN**

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I also wish to record my deep sense of appreciation and gratitude to the patients, who have co-operated for this study.

CONTENTS

INTRODUCTION

Management of enterocutaneous fistula associated with high morbidity & mortality due to inadequate nutrition, sepsis fluid & electrolyte disturbance and skin digestion.

The single most common cause of enterocutaneous fistula is following surgical operation, blunt & penetrating trauma. As general rule, more proximal fistula will have high output. So the high output fistulas are more likely to be associated with malnutrition, sepsis, fluid, electrolyte imbalance leading to lower incidence of spontaneous closure. Spontaneous closure is dependent on number of factors which include anatomical site, presence of intercurrent disease and associated abscesses or multiple tracts.

AIM OF THE STUDY

- To study about the role of early enteral feeding in early closure of enterocutaneous fistula in post-operative patients.

REVIEW OF LITERATURE

Enterocutaneous fistula is an abnormal communication between gastro-intestinal tract and skin. Majority of the fistula develop after surgery or trauma to abdomen.

It represent a second group of complex intraperitoneal infectious processes.

Mortality in enterocutaneous fistula between 10-30% - purely due to

1. Intraperitoneal sepsis
2. Malnutrition
3. Electrolyte Imbalance

Classification:

Enterocutaneous Fistula classified as

I. Etiological classification

II. Anatomic classification

III. Physiologic classification

I. Etiological Classification:

Enterocutaneous Fistula results from several processes

1. Diseased bowel extending to surrounding structures.
2. Extraintestinal disease involving otherwise normal bowel.
3. Trauma to normal bowel including inadvertent or missed enterotomies.
4. Anastamotic disruption following surgery.

Enterocutaneous Fistula may be classified as

1. Post-operative - 75%
2. Spontaneous - 25%

Post-operative Fistulas:

Occur following the procedures for malignancy, inflammatory bowel disease & adhesions. The patient factors of post-operative fistula include.

- Malnutrition
- Infection
- Emergency surgery with hypotension anaemia, Hypothermia & poor O_2 delivery.

The ECF result from

1. Disruption of Anastamosis
2. Inadverent bowel injury during dissection or abdominal closure.

Spontaneous Fistula: (25%)

Develop in patients with

1. Inflammatory bowel disease (most common)
2. Cancer
3. Following radiation therapy
4. Diverticular disease
5. Perforated ulcer disease
6. Ischemic bowel

II. Anatomic Classification:

1. Oral, Pharyngeal, Esophageal fistulas:

The leading cause is

Advanced Head & Neck Malignancies & other associated causes,

- Alcohol and tobacco use

- Poor nutrition
- Pre-operative chemoradiation therapy

Less common causes

- Tuberculosis
- Laryngeal or thoracic surgery trauma
- Congenital neck cysts
- Anterior cervical spine fusion
- Foreign body perforations

2. Gastric fistulas:

Most commonly following a gastrostomy feeding tube in situ of more than 9 months.

Preservation of blood supply will reduce the risk of gastric fistula formation.

3. Duodenal Fistula:

Develop after gastric resection surgery involving duodenum, colon, pancreas, aorta, kidney, biliary tract.

Types,

1. Lateral duodenal fistula
2. Duodenal stump fistula

Decreased spontaneous closure rate with lateral duodenal fistula.

Small Bowel Fistula:

The majority of fistulas are arising from small intestine by these 70-90% of enterocntaneous fistulas occur in post-operative period. These fistula result from either

1. Disruption of anastamoses
2. Injury to the bowel during dissection
3. Closure of abdomen.

The most common procedures antecedent to small bowel fistula formation are

1. Cancer
2. Inflammatory Bowel disease
3. Adhesiolysis

Spontaneous small bowel fistula arise from

1. Inflammatory bowel disease
2. Cancer
3. Peptic ulcer disease
4. Pancreatitis.

Of these crohns disease is the most common cause of spontaneous small bowel fistula. Crohns fistula typically follow one of two courses.

The first one represent fistulas that present in early post-operative period following resection of a segment of diseased bowel. These fistulas arise in otherwise healthy bowel and follow a course similar to non-crohns fistula with a significant likelihood of spontaneous closure.

The other group of crohn's fistula arises in diseased bowel and has a low rate of spontaneous closure. If spontaneous closure occur, these fistula often reopen on resumption of enteral intake. Early operative closure of these fistulas should be considered. The microperforation may cause abscess formation and erosion into adjacent structures or skin. In small bowel fistulas the microperforation in small bowel may cause abscess formation and erosion

into adjacent structures or skin.

Colonic Fistula:

Spontaneous fistulas of the colon result from diverticulitis, malignancy, inflammatory bowel disease appendicitis and pancreatitis – while treatment of these conditions account for the majority of post-operative colocutaneous fistulas. Anastomotic breakdown or extension from inadequately resected disease bowel account for majority of post-operative fistulas. Additionally, with gastrocutaneous fistulas, an increased incidence of colocutaneous fistulas has been reported following percentaneous gastrostromy placement. Injury at the time of gatrostomy placement, & erosion of a properly placed gastrostomy tube has been proposed as mechanisms of these complication.

III. Physiologic Classification:

Enterocutaneous fistulas cause the loss of fluid, minerals, trace elements, and protein as well as allow the release of irritating and caustic substances into the skin & subcutaneous tissue.

Fistula may be divided into

High output (>500ml / day)

Moderate output (200-500ml / day)

Low output (<200ml / day)

The mortality rate in fistulas,

High output - 50% are likely to be of small bowel origin.

Low output - 26% are likely to be of large bowel origin.

Prevention:

Proper preoperative preparation and meticulous surgical technique will lessen the risk of post-operative fistula formation. In elective setting, operation may be delayed to allow for normalization of nutritional parameters, thus optimizing wound healing and immune function.

The nutritional characteristics to increase the risk of anastamotic breakdown are

1. Weight loss of 10-15% of total body weight over 3-4 months.
2. Serum albumin less than 3mg/dl.
3. Serum transferrin less than 220mg/dl

4. Anergy to recall antigens
5. Inability to perform activities of daily living due to weakness.

The mechanical bowel preparation for elective colon operations combined with systemic antibiotics with activity against enteric organisms provides adequate porphylaxis.

In emergency surgeries, delays for optimization of nutritional status and bowel preparation are not possible.

Since good results can be obtained by

- Adequate resuscitation and restoration of circulating volume.
- Normalization of hemodynamics
- Providing appropriate antibiotics
- Meticulous surgical techniques
- Performance of anastamoses in a healthy well perfused bowel without tension provides best chance of healing.
- Careful hemostasis to avoid post-operative hematoma formation will decrease the risk of abscess formation & inadvertent enterotomies and serosal injuries should be identified and repaired.

The omental flaps should be used to separate anastamosis and

abdominal incision. In abdominal wall closure by using healthy tissue and by avoiding injury to the underlying bowel can prevent post-operative fistula formation. In post-operative period, further resuscitation may be required to ensure hemodynamic stability and avoid inadequate tissue oxygenation. It is also essential to avoid periods of transient post-operative hypotension related to anaesthesia.

Body Fluid Electrolyte Composition

Source	Volume (mL/day)	pH	Na	K	HCO_3^-	Cl
Gastric	2000–2500	<4	60	10	—	90
		>4	100	10	—	100
Pancreatic	1000		140	5	90–110	30–45
Bile	1500		140	5	35	100
Small bowel	3500		100–130	15	25–35	100–140
Diarrhea	1000–4000		60	10–20	10	45–65
Urine	1500		20–40	20	—	20
Sweat			50	5	—	55

All values for sodium, potassium, bicarbonate, and chloride given in milliequivalents per liter.

Pathophysiology:

The factors that play major role in morbidity and mortality are

1. Sepsis
2. Malnutrition

3. Electrolyte abnormalities

The leakage of intestinal contents results in loss of electrolytes & protein rich fluid.

By observing the source of fistula chemical analysis of fistula output, frequent serum electrolyte determinations and aggressive replacement represents the best approach.

The nutritional status is also associated with high mortality. The serum albumin level of less than 2.5gm/dl resulted a high mortality.

By provision of nutritional support to make positive nitrogen balance will aid in the ability of spontaneous healing in enterocutanous fistula.

Recent works on mucosal immune hypothesis suggests that both the route & type of nutrition affect the maintenance of intestinal and respiratory integrity and the outcome of critically ill patients. The immune cells are sensitized to foreign antigens in the payer's patches of the distal small intestine. The sensitized cells are then distributed to submucosal locations on both the intestine & respiratory tract as well as mammary, salivary and lacrimal glands where IgA is secreted. By provision of a complex enteral

formulation protected the immune function better than total parenteral nutrition (TPN). Thus the vicious cycle of sepsis contributing to hypercatabolism and malnutrition leading to decreased immunity must be broken successfully by treating these patients with immuno suppressive role of nutrition especially with early enteral nutrition.

Social & Psychological Impact:

The social & psychological impact of Enterocutaneous Fistula cannot be overlooked due to the complicated wound care required, malnutrition and disability patients with fistula will be unlikely to be able to work and may lose their employment & source of income insurance.

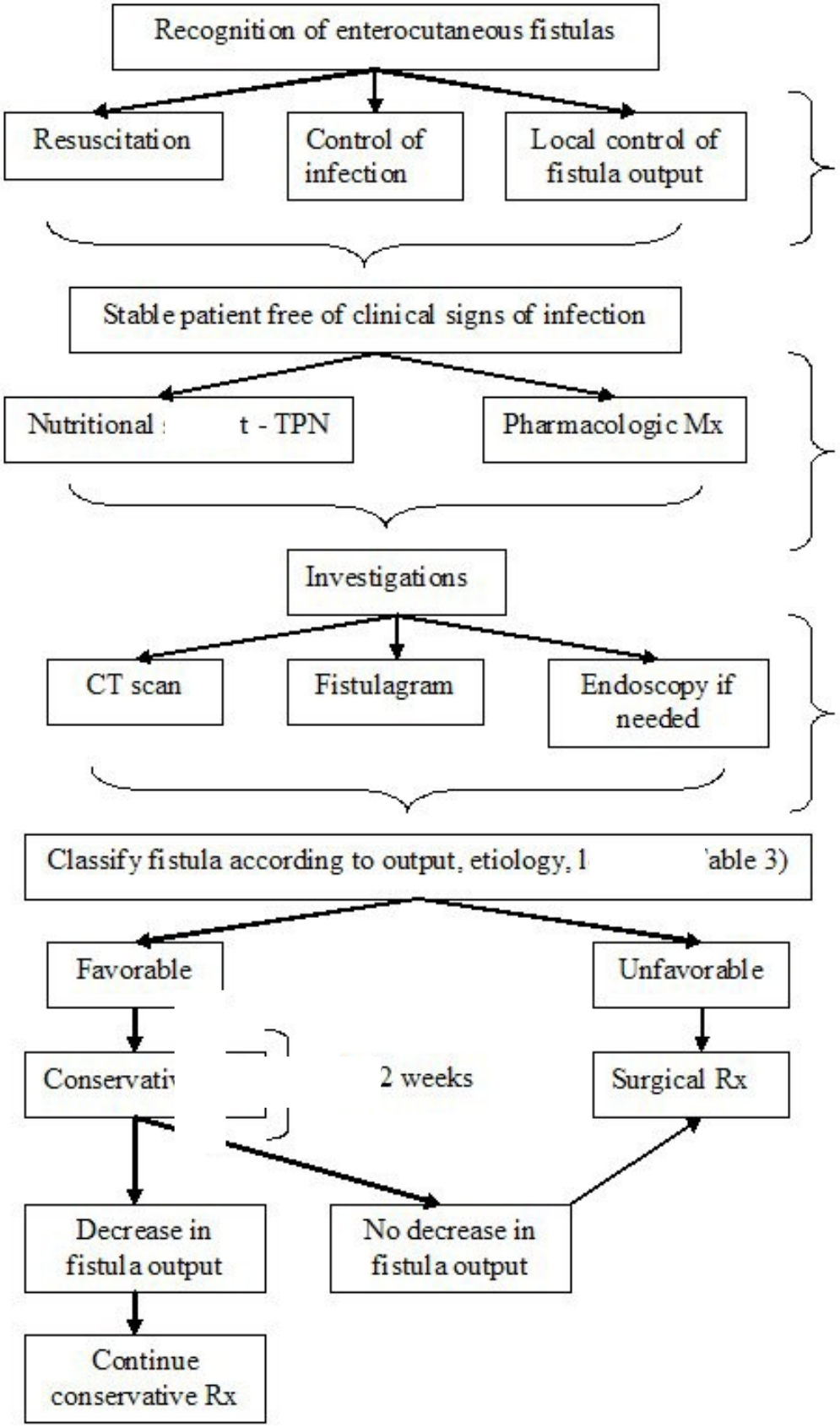
These patients may become dependent on others for financial support and medical assistance. Additionally the psychological impact of a difficult, draining, foul-smelling wound and the major impact on the patients daily activities of living cannot be underestimated.

Diagnosis, Evaluation and Management:

The ultimate goals in treating patients with enterocutaneous fistula are

the re-establishment of bowel continuity.

- The ability to achieve oral nutrition
- Closure of the fistula


Recognition of enterocutaneous fistulas
Resuscitation
Control of infection
Local control of fistula output
Stable patient free of clinical signs of infection
Nutritional
t - TPN
Pharmacologic Mx
Investigations
CT scan
Fistulagram
Endoscopy if needed
Classify fistula according to output, etiology, l
able 3)
Favorable
Unfavorable
Conservati
2 weeks
Surgical Rx
Decrease in fistula output
No decrease in fistula output
Continue conservative Rx

Factors that influence the spontaneous closure

Factor	Favorable	Unfavorable
Organ of origin	Oropharyngeal	Gastric
	Esophageal	Lateral duodenal
	Duodenal stump	Ligament of Treitz
	Pancreaticobiliary	Ileal
	Jejunal	
	Colonic	
Etiology	Postoperative	Malignancy
	Appendicitis	Inflammatory bowel disease
	Diverticulitis	
Output	Low (<200–500 mL/day)	High (>500 mL/day)
Nutritional status	Well-nourished	Malnourished
	Transferrin >200 mg/dL	Transferrin <200 mg/dL
Sepsis	Absent	Present
State of bowel	Healthy adjacent tissue	Diseased adjacent bowel
	Intestinal continuity	Distal obstruction
	Absence of obstruction	Large abscess
		Bowel discontinuty
		Previous irradiation
Fistula characteristics	Tract >2 cm	Tract <1 cm
	Bowel wall defect <1 cm^2	Defect >1 cm^2
		Epithelialization
		Foreign body
Miscellaneous	Original operation performed at same institution	Referred from outside institution

The goals can best be achieved by the use of a detailed

multidisciplinary management protocols these protocol divided into several phases.

Phase 1: Recognition & stabilization

Phase 2: Investigation

Phase 3: Decision

Phase 4: Definitive management

Phase 5: Healing

Phase 1: Recognition and Stabilization:

The goals in Recognition and Stabilization are

1. Identification & resuscitation
2. Control of sepsis
3. Control of fistula drainage and skin care
4. Reduction of fistula output
5. Nutritional support

1. Identification & Resuscitation:

In these the combined results of preoperative disease process, bowel preparation, a week of minimal nutritional support, and a septic state often results in a profoundly volume depletion.

So, in this stage the restoration of volume is by using

- Crystalloids
- Colloid products

These will aid the O_2 carrying capacity and plasma oncotic pressure.

Several litres of crystalloids are usually required to replace fluid lost into the bowel & bowel wall. Blood to be transfused to a hematocrit of at least 30%.

The albumin may aid in wound healing and intestinal function and involved in the transport of certain nutrients and medications. Administration of albumin to a serum level of 3.0mg/dl supports these functions.

2. Control of Sepsis:

The leakage of enteric contents outside of the bowel lumen may lead to generalized peritonitis and abscess formation. So, aggressive management of sepsis is essential. Frankly septic patients should be explored to drain abscess

by percutaneous or open drainage. During these procedures a fistulogram is essential by injecting a water soluble contrast, into the abscess under fluoroscopic guidance. Antibiotics should only be given for defined infections according to the sensitivity.

3. Control of Fistula Drainage & Skin Care:

This will prevent continued irritation of the surrounding skin and abdominal wall structures.

The Robinson nephrostomy tube which placed in the wound, is soft at body temperature and will not erode into the bowel or abdominal wall structures. This tube is connected to wall suction and vented with a 14 gauge catheter. Accurate recording of fistula output is fascilitated by drainage system.

Protection of the surrounding skin from enteric drainage and frequent dressing changes can be achieved through a number of preparations including Karaya powder, Ileostomy cement, stomahesive & ion exchange resins.

More recently Vacuum Assisted Closure (VAC) devices have been reported to both aid in the care of these complicated wounds and promote

non-operative closure. These dressing need only be changed every 5 days. The disadvantage of VAC is the amount of time necessary to change these dressings is 2 -2.5hrs.

4. Reduction of Fistula Output:

While the fistula output does not correlate with the rate of spontaneous closure, reduction of fistula drainage may facilitate wound management and decrease the time to closure. The drugs to decrease the fistula output.

- Histamine antagonists
- Proton pump inhibitors
- Sucralfate
- Somatostatin & its analogue
- Infliximab

H2 blockers & Proton Pump Inhibitors reduce the acid secretion will prevent gastric & duodenal ulcerations & decrease secretion of pancreatic secretions.

Sucralfate – a mucosal protective agent may decrease gastric acidity & providing a constipating action that decrease the fistula output. The

somatostain & its analogue octreotide may decrease the secretion of many Gastrointestinal Hormones & reduce the time of closure & promote nonoperative closure of enterocutaneous fistula by reducing the fistula output.

Potential side effects are

- Difficult glucose homeostasis
- cholelithiasis

Infliximab – monoclonal antibody to tumor necrosis factor – α has been to be beneficial in inflammatory and fistulizing inflammatory bowel disease.

5. Nutritional Support:

Nutritional support is one of the key factor in overall outcome of the case of Enterocutaneous Fistula.

The malnutrition in Enterocutaneous Fistula is by

i) Loss of protein rich intestinal secretions

ii) Inadequate nutrient intake

iii) Ongoing sepsis with catabolism

The nutritional support is by

i) Enteral

ii) Parenteral

of these enteral route is a best preferable one.

Requirements for Enteral Feeding:

- No Distal bowel obstruction
- At least 4 feet of small bowel necessary

"**IF THE GUT FUNCTIONING – ENTERAL FEEDING IS A BEST ONE**"

Merits:

- Safe
- Cheaper when comparing to Total Parenteral Nutrition
- Prevent atrophy of Gastrointestinal mucosa
- Stimulate manufacture of immunoglobins in the gut – improve immune function
- Support hormonal functions of gut & liver.
- Improve bowel caliber, thickness & ability to hold sutures
- Decrease the fistula output

Routes

- Per os
- Via Nasogastric feeding tube
- Via Nasoenteric feeding tube
- Via fistula itself (fistuloclysis)

General Guideline of Nutritional Management:

25-32 kilocalories / kg / day

Calorie : nitrogen ration of 150 : 1 to 100 : 1

Protein 1.5gms / kg / day

are the basic requirements.

Parenteral Nutrition:

Usually given through a central vein. It is expensive & requires dedicated nursing care to prevent complications in line insertion catheter

sepsis & metabolic complications and also these patients should be free of the co-morbid conditions.

Phase 2: Investigations:

This typically occurs 7-10 days after identification of fistula and allows time for the fistula tract to mature to the point where catheters can be placed in all orifices.

The investigations are,

1. Fistulography
2. CT in sagittal or reconstructed images
3. Barium contrast studies

Fistulography with water soluble contrast provides informations about the

- Length, course, relationship of fistula tract
- Absence or presence of abscess cavity

- Bowel continuity
- Distal obstruction
- Nature of bowel adjacent to fistula

CT:

Most useful in early management of patients with fistula to identify abscesses and guide percutaneous intervention.

The sagital or reconstructed images may provide useful information about fistula tract.

Barium Study:

Barium contrast upper Gastrointestinal studies and enemas rarely provide additional information.

Phase 3: Decision:

Ideally, provision of a period of sepsis free nutrition will result in closure of Enterocutaneous Fistula within 4-6 weeks.

So, the decision for surgical intervention is based on

- Where to intervene &

- When to intervene

Where to intervene,

1. Fistula arising from diseased bowel
2. In proximity to large abscesses
3. Disruption of intestinal continuity
4. In presence of distal obstruction
5. Short tracts <2cm
6. Fistula originating from stomach, near ligament of Treitz, Ileum
7. Fistula in malignancy
8. Fistulas in irradiated bowel

When to intervene,

The timing of intervention in fistula is very very important. The definitive operative management in Enterocutaneous Fistula after 4-6 weeks is ideal. By the time we can watch for spontaneous closure & the delayed intervention allows.

1. Nutritional support
2. Nomalisation of Sr. albumin

3. Normalisation of Sr. transferrin
4. Allows resolution of local abdominal wound sepsis
5. Preparation of bowel wall for secure closure
6. Adhesions will mature & easier to deal after that interval

Phase 4: Definitive Management:

The definitive management of Enterocutaneous Fistula is operative reconstruction. This is achieved by

- Optimal nutritional parameters
- Free of all signs of sepsis
- Well healed abdominal wall without inflammation
- Tapering of tube feeding prior to surgery to achieve mechanical & antibiotic preparation of bowel
- Fresh team of plastic and reconstructive surgeons

Incision used are,

1. Transverse incision
2. Along with prior midline incision

of these, transverse incision offers best opportunity to enter the abdomen free of adhesions.

Dissection:

- Refunctionalization: Dissection to free the entire length of the bowel from the ligament of treitz to rectum. This identifies & allows resection of all areas of abscess & all sources of obstruction to avoid the chances of failure.
- Sharp dissection using scalpel & scissors prevent inadverent damage to bowel
- Closure of all enterotomies & serosal tears
- Resection of bowel involved in the fistula
- Careful anastamosis using a two layer interrupted, End to end with non-absorbable sutures in healthy bowel, without tension and ensuring adequate blood supply.
- Frequent irrigation of abdominal cavity with antibiotic solution
- Inadverent bowel injury to be avoided
- Placement of flap of omentum between the fresh anastamosis &

abdominal wall closure to prevent recurrence of fistulas.

- Placement of decompressive gastrostomy & feeding jejunostomy for post-operative care of patients.
- The abdominal wall closure done by
    1. Primary closure if there is no previous inflammation & sepsis.
    2. Using a complex myocutoneous flap procedure with the help of plastic & reconstructive surgeons.

"UNDER NO CIRCUMSTANCES SHOULD MESH (OR) GORETEX BE USED FOR CLOSURE"

Laparoscopy has only a limited role in Enterocutaneous Fistula.

Phase 5: Healing:

Whether closure of fistula occur spontaneously or by operative management the confirmation of supportive treatment is essential. This is mainly achieved by

- Nutritional support
- Physical & emotional support

Nutritional support via tube feeding should be confirmed until the

patient is consistently tolerating at least 1500 kilocalories / day orally. This is mainly for healing of surgical wound & anastamoses which requires a positive nitrogen balance to avoid breakdown of newly formed proteins. Oral feeding typically commences one week post operatively with soft diet. Zinc supplementation may improve patients sense of taste to increase the oral intake.

The physical and emotional support by the physical & occupational therapists is more important during healing phase to reintroduce the patient to normal activities of daily living.

SUMMARY

- Gastrointestinal cutaneous fistula remain a dreaded complication in abdominal surgeries, cancer & inflammatory disease.

- An understanding of pathophysiology & risk factors may minimize their creation and to provide sound plan for management.

- Early recognization and resuscitation with control of sepsis & provision of nutritional support may limit associated complications.

- Investigation into the anatomic and etiologic characteristics of fistula may provide information about the likelihood of spontaneous closure or suggest earlier operative management.

- Careful planning and technique during definitive surgical therapy and involvement of multidisciplinary team will provide best possibility of resolution of fistula.

- Post-operative maintenance of adequate nutrition and physical, emotional support may allow restoration of the patient to a functional and productive role in society and ensures the durability of the repair.

DISCUSSION

Patients with post-operative enterocutaneous fistula are often malnourished due to a combination of poor enteral intake, hypercatabolic septic state, and the loss of protein rich enteral contents through the fistula.

Proper nutrition may improve immune function, provide protein precursors for wound healing and support the functions of gastrointestinal tract.

Once sepsis controlled, the attention should be focused towards the metabolic & nutritional supports.

As the general guidelines by provision of

25-32 kilocalories/kgm/day with 150:1 to 100:1 calorie : nitrogen ratio & 1.5gms/kg/day of protein necessary for early closure.

Transition to partial or total enteral nutrition has been advocated to prevent atrophy of gastrointestinal mucosa and support the immunologic and hormonal functions of gut and liver.

Enteral feeding given via per OS, feeding tubes nasoenterically or nasogastrically or via fistula itself.

Enteral support typically requires 4 feet of small intestine without distal

obstruction. Drainage from fistula expected to increase with commencement of enteral feeding, spontaneous closure may occur, often proceeded by a decrease in fistula output. By normalization of nutritional parameters will provide the patient with the best chance for successful fistula resolution if operative intervention needed by providing improved bowel caliber, thickness and ability to hold sutures.

METHODS AND MATERIALS

This study has been based on the analysis of early enteral feeding in enterocutaneous fistula post-operatively in General Surgical wards and Gastroenterology wards, in Govt. Rajaji Hospital over a period of 2001-2008.

Patients were aggressively resuscitated with fluid & electrolytes in the first 48 hrs. Simultaneously stoma care apparatus was applied to protect the skin from effluent & give accurate measurement of daily fistula output. The nutritional support with enteral feeding started. By using fistulography, Barium study the anatomical site of fistula traced. With USG & CT intra-abdominal abscess localized and drained. Once the patients conditions stabilized the surgical procedure planned.

Octreotide was used in all cases of high output fistula. After a period for correction of sepsis & with nutritional support uncomplicated fistula closed, & with complicated fistula definitive closure done by surgeries.

RESULTS

There were 30 cases of Enterocutaneous fistula identified post operatively in Govt. Rajaji Hospital, Madurai.

AGE DISTRIBUTION

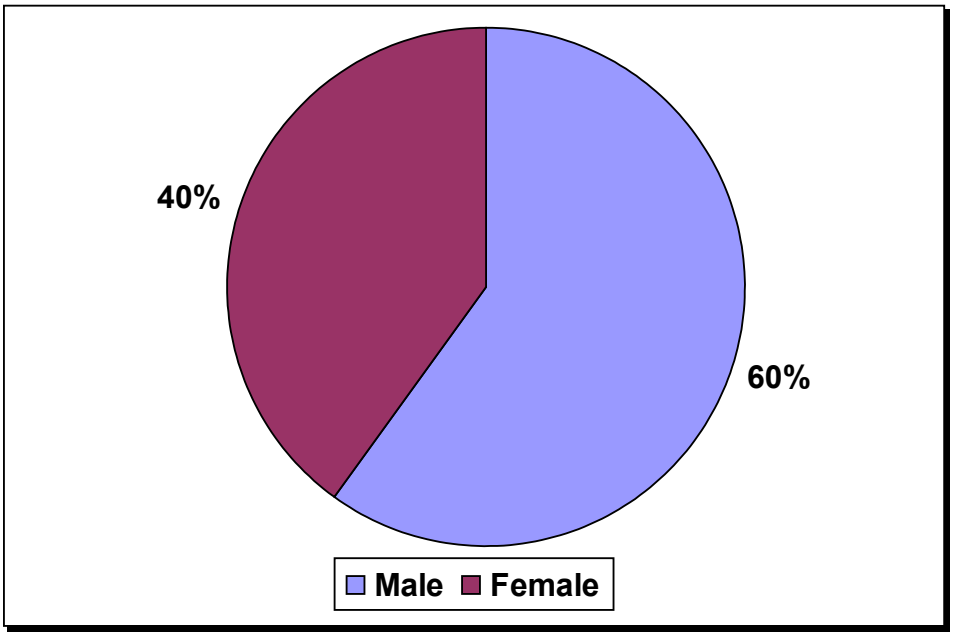
AGE	FREQUENCY	PERCENTAGE
<18yrs	0	0%
18-30	4 (3+1)	13.3%
31-40	5 (3+2)	16.7%
41-50	7 (4+3)	23.3%
51-60	8 (4+4)	26.7%
61-70	5 (3+2)	16.7%
>70yrs	1 (1+0)	3.3%

Minimum : 26 yrs Maximum : 72 yrs

SEX DISTRIBUTION

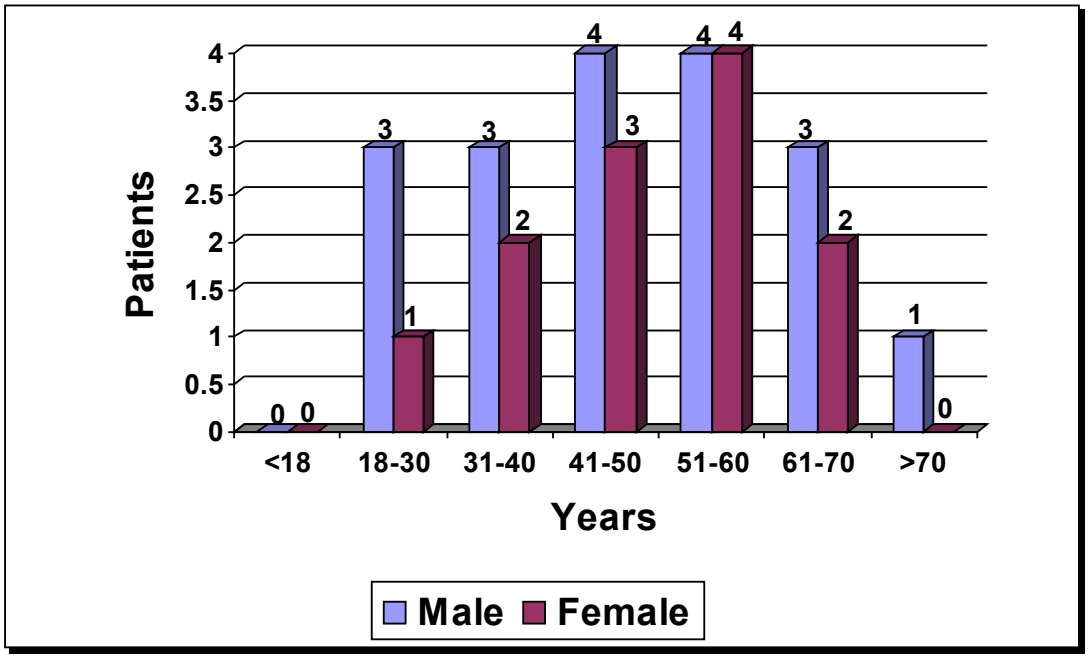
SEX	FREQUENCY	PERCENTAGE
Male	18	60%

Female	12	40%



AGE & SEX DISTRIBUTION

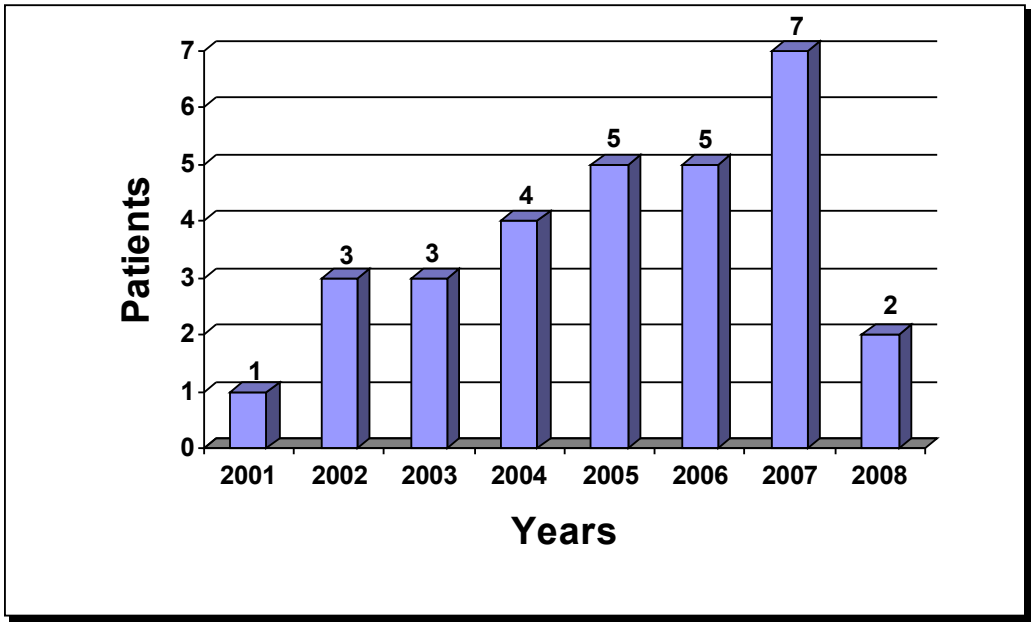
AGE & SEX	MALE	FEMALE
<18yrs	0	0
18-30	3	1
31-40	3	2
41-50	4	3
51-60	4	4
61-70	3	2
>70yrs	1	0



YEAR DISTRIBUTION (Jan 2001 to Oct 2008)

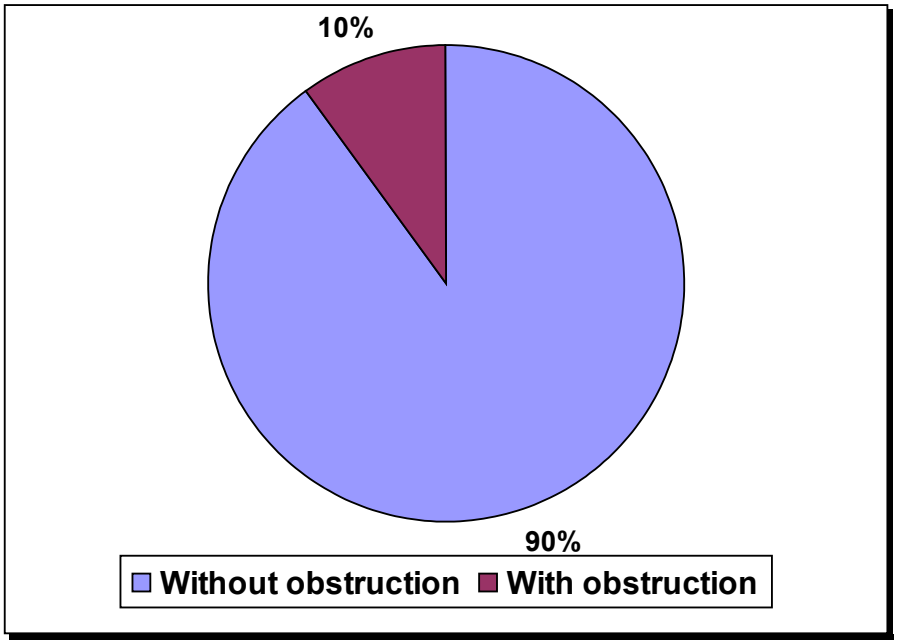
YEAR	PATIENTS
2001	1
2002	3
2003	3
2004	4
2005	5

2006	5
2007	7
2008	2



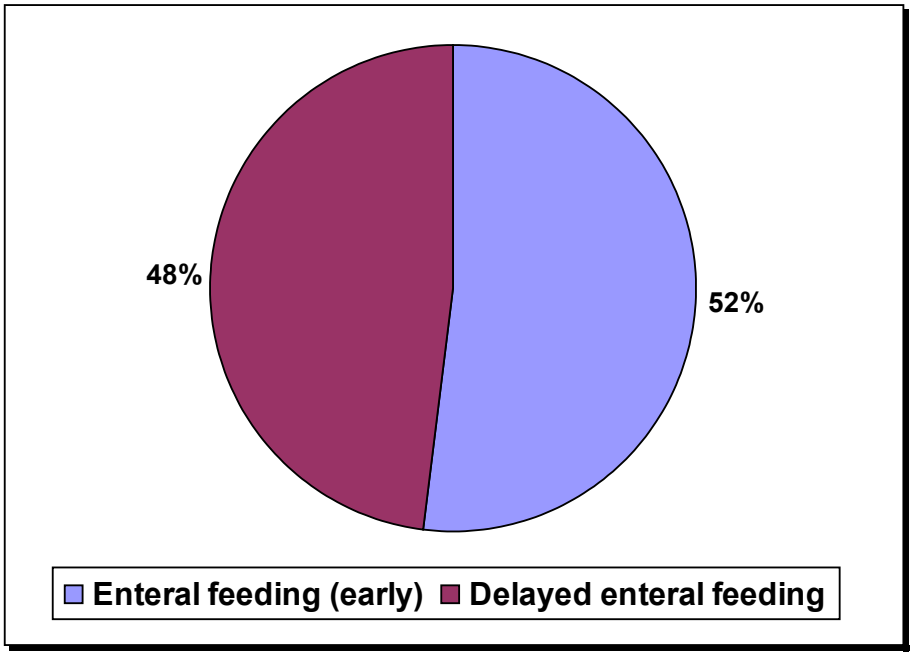
FISTULA GRADING BY DISTAL OBSTRUCTION

	Cases	Percentage
Without obstruction	27	90%
With obstruction	3	10%



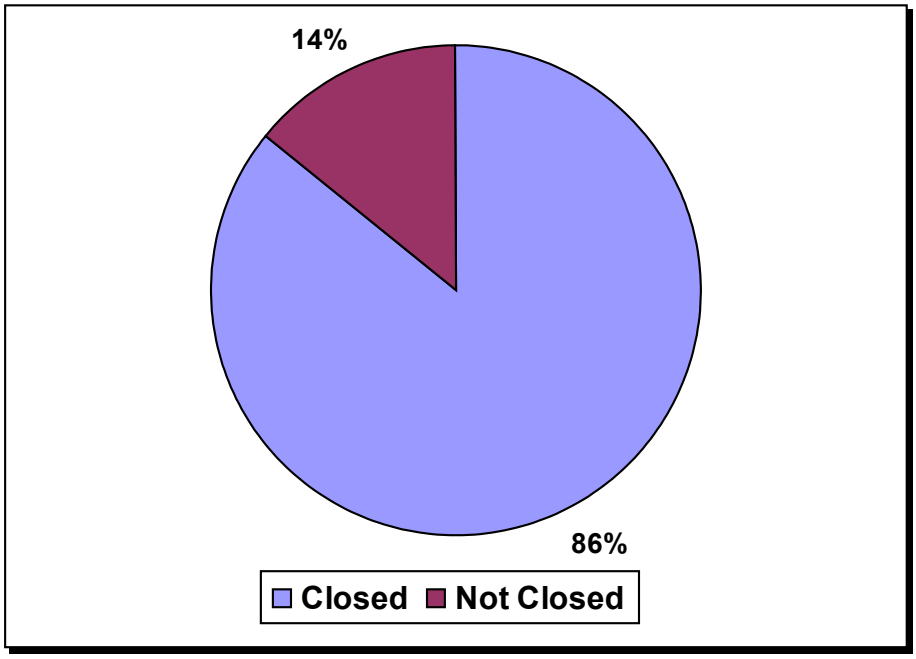
GRADING BY ENTERAL FEEDING

	Cases	Percentage
Enteral feeding (early)	14/27	51.85%
Delayed enteral feeding (after 10 days)	13/27	48.15%



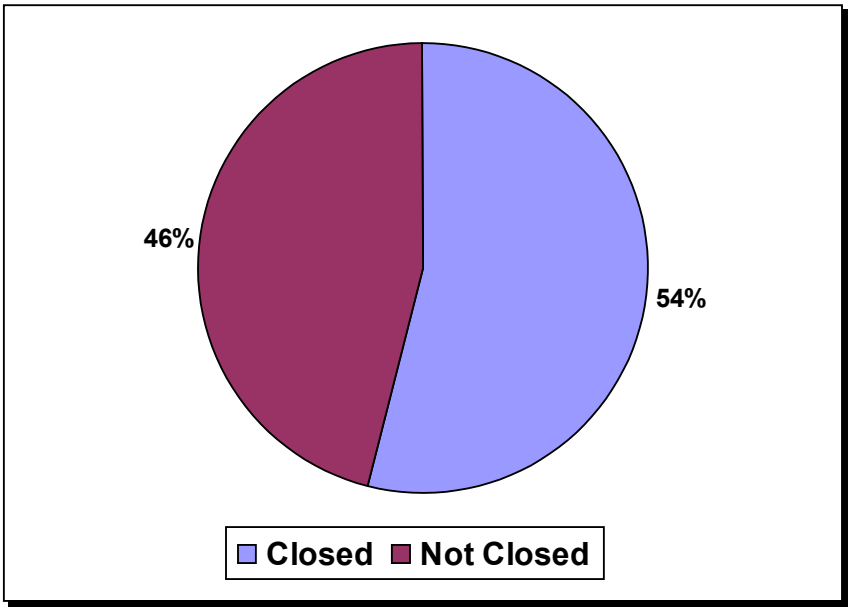
Results: IN EARLY ENTERAL FEEDINGS (14 cases)

	Cases	Percentage
Fistula closed spontaneously within 30 days	12/14	85.71%
Pessists	2/14	14.29%


14%
86%
Closed
Not Closed

ENTERAL FEEDING AFTER 10 DAYS (13 cases)

	Cases	Percentage
Closed spontaneously in 30-45 days	7/13	53.85%
Not closed	6/13	46.15%



CONCLUSIONS

1. Enterocutaneous fistula with distal obstruction – definitive management is surgery.
2. In cases without distal obstruction. Fistula closure by early enteral feeding in 12 out of 14 cases within 30 days i.e. 85.71%.
3. In cases without distal obstruction. Fistula closure by delayed enteral feeding is 7 out of 13 cases i.e. 53.85%

So, by these studies, early enteral feeding favours the improvement of general condition of the patients and thereby early closure of entero-cutaneous fistula.

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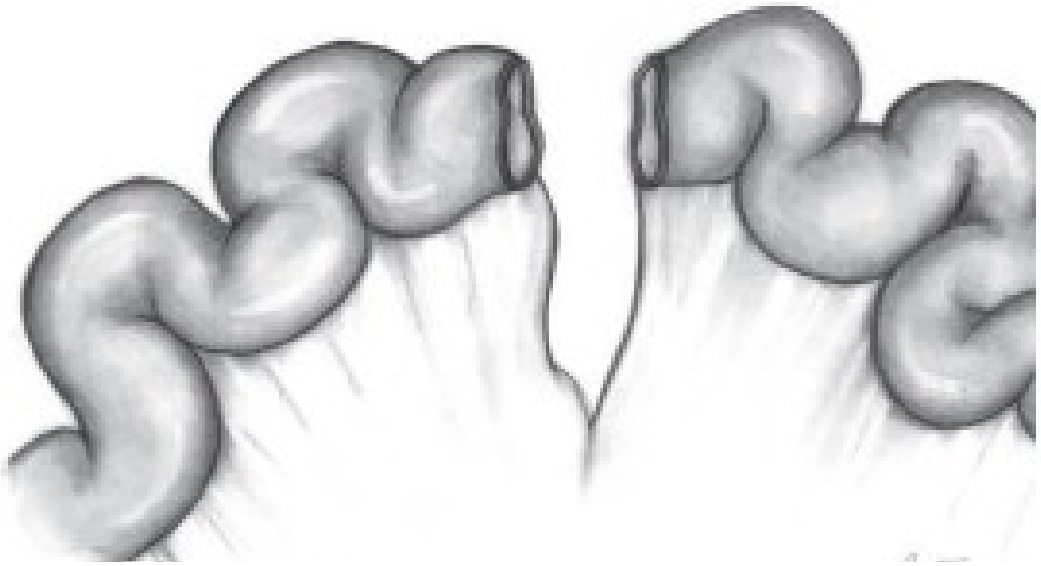
MASTER CHART

S. No	Name	Age	Sex	Diagnosis	Surgery	Time interv between surgery & fistula in da

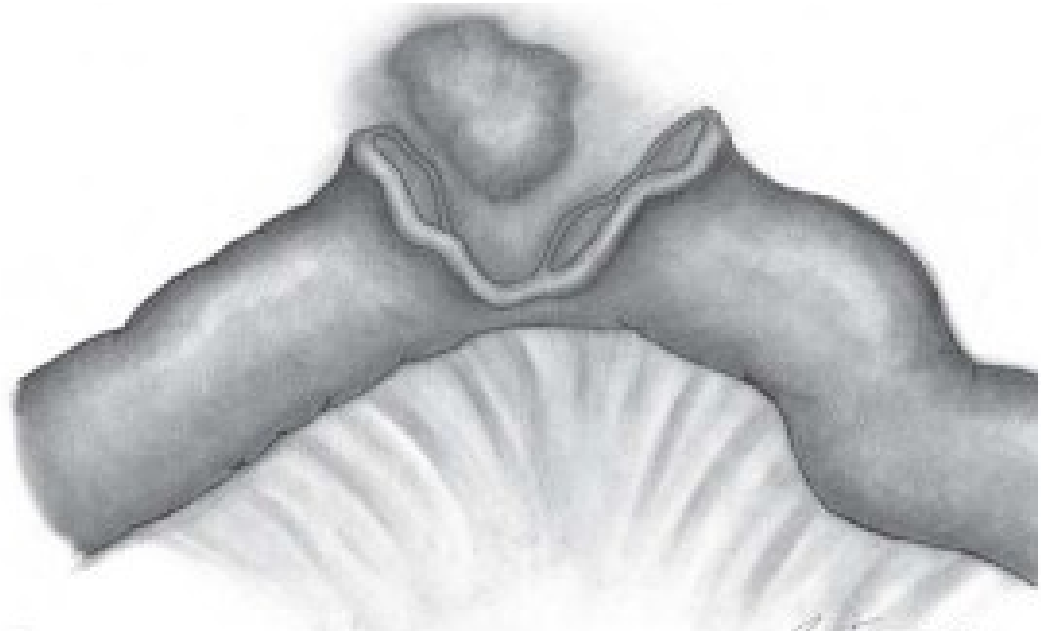
1	Alagar	28	M	Appendicular abscess	Emergency laparotomy & drainage	6
2	Ponnuchamy	62	M	Acute intestinal obstruction sigmoid volvulus	Emergency laparotomy resection & anastamosis	7
3	Pandi	55	M	Perforative peritonitis ileal perforation	Emergency laparotomy perforation closure	7
4	Rani	29	F	Septic abortion with small bowel perforation	Hysterectomy & resection anastamosis	7
5	Selvi	53	F	Ac. Intestinal obstruction post operative	Emergency laprotomy with adhesiolysis	5
6	Karupiah	49	M	Perforative peritonitis multiple ileal perforation	Emergency laparotomy with resection anastamosis	6
7	Velayutham	29	M	Stab injury abdomen multiple small bowel perforation	Emergency exploratory laparotomy resection anastamosis	6
8	Thangam	46	F	Appendicular abscess	Emergency laparotomy & drainage	5
9	Adaikalam	39	M	Strangulated inguinal hermia. Left	Emergency exploration resection anastamosis & herniorrhaphy	6
10	Rajeswari	56	F	Ca-caecum with acute intestinal obstruction	Emergency exploration Ileo-transverse anastamosis	6
11	Annamalai	30	M	Stab injury abdomen multiple ileal perforation	Emergency laparotomy with resection anastamosis	7
12	Mahalakshmi	52	F	Stab injury abdomen jejunal injury	Emergency laparotomy with primary closure	5

13	Vidhyammal	44	F	Acute intestinal obstruction post-operative	Emergency laparotomy with adhesiolysis	7
14	Raju	34	M	Blunt injury abdomen. Multiple Ileal perforation with retro peritoneal hematoma	Emergency laparotomy. resection anastamosis	6
15	Karuppan	48	M	Carcinoma sigmoid colon	Exploratory laparotomy. Left hemicolectomy colorectal anastamosis	7
16	Vaideeswari	34	F	Appendicular perforation	Emergency laparotomy appendicectomy done	7
17	Ramadoss	56	M	Strangulated right inguinal hernia	Emergency exploration resection anastamosis herniorrhaphy done	8
18	Annadurai	38	M	Acute intestinal obstruction - post operative	Emergency laparotomy adhesiolysis	6
19	Muniyandi	61	M	Advanced periampullary carcinoma	Exploratory laparotomy – palliative choledochojejunostomy with gastrojejunostomy with jejunojejunostomy	6
20	Kamalam	64	F	Bull gore injury abdomen - multiple small bowel injury	Exploratory laparotomy – Resection & anastamosis done	6
21	Mariyappan	72	M	Sigmoid volvulus	Emergency laparotomy with descending colon colostomy	6
22	Karupayee	31	F	Hydatiform mole – Post-MTP bowel injury	Emergency laparotomy – Sigmoid colon injury – Hartmans procedure	7

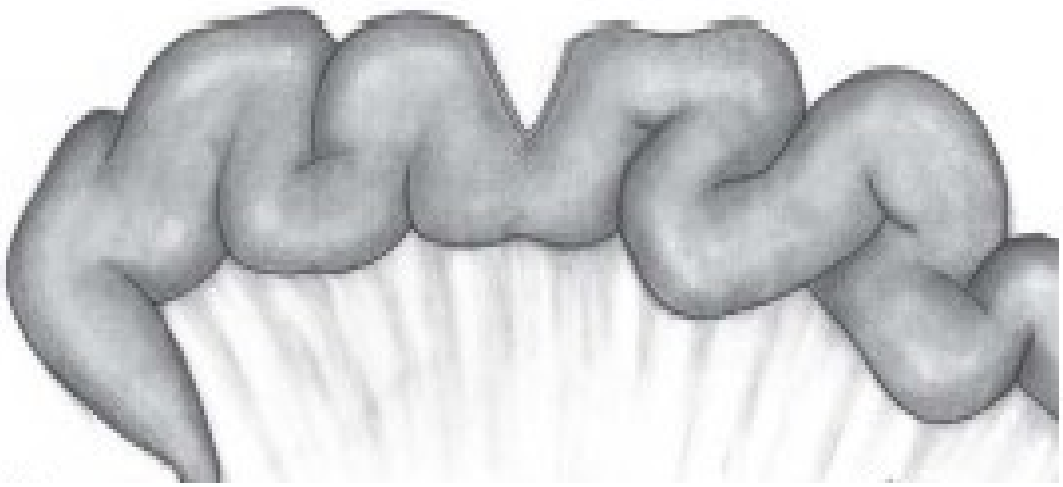
					done	
23	Vellaisamy	45	M	Blunt injury abdomen	Emergency laparotomy jejunal transection – anastamosis end to end done	6
24	Maduraiveeran	53	M	Strangulated left inguinal hernia	Emergency exploration – Resection anastamosis Herniorrhaphy	7
25	Paraman	47	M	Appendicular Abscess	Emergency laparotomy & Drainage	8
26	Duraichi	57	F	Post-operative adhesive obstruction – post hystrectomy	Emergency laparotomy adhesiolysis	7
27	Thangammal	62	F	Stab injury abdomen small bowel injury	Emergency laparotomy resection anastamosis done	6
28	Alamu	48	F	Postoperative (Hystrectomy). With acute intestinal obstruction	Adhesiolysis done	7
29	Ambikabathy	38	M	Strangulated right inguinal hernia	Emergency exploration – resection anastamosis of ileum done	7
30	Kalidas	64	M	Bull gore injury abdomen injury sigmoid colon	Emergency laparotomy – Resection anastamosis	6



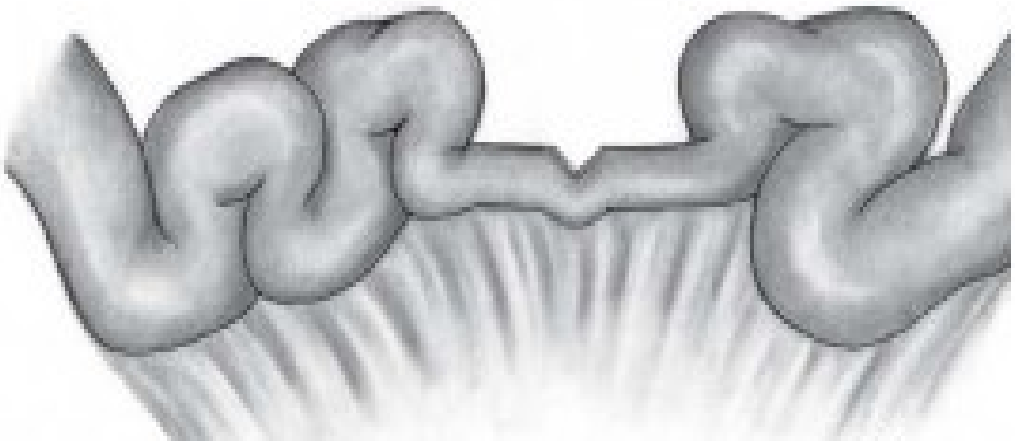
A. TOTAL ANASTOMOTIC DISRUPTION



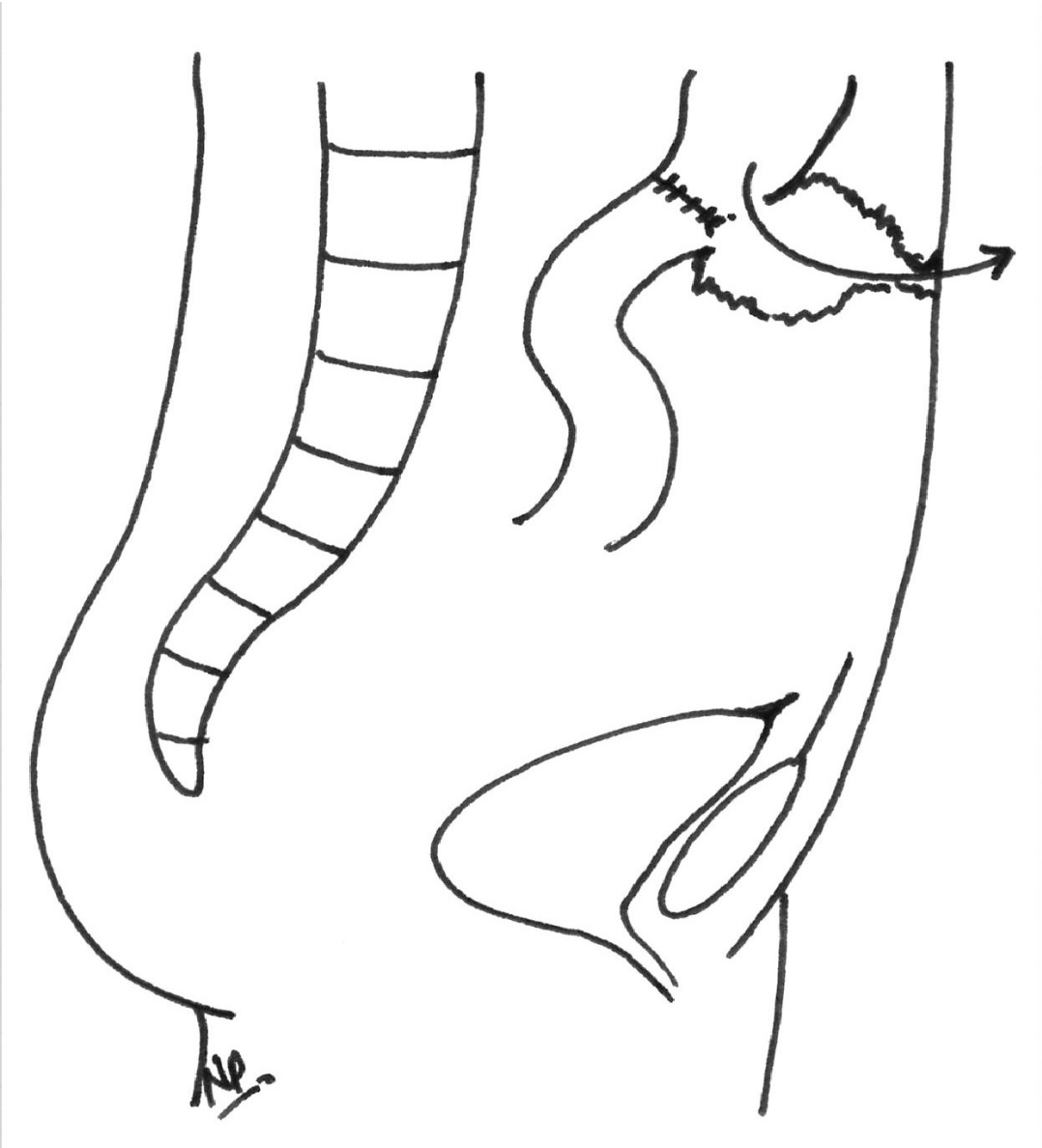
B. PARTIAL DISRUPTION WITH ADJACENT ABSCESS



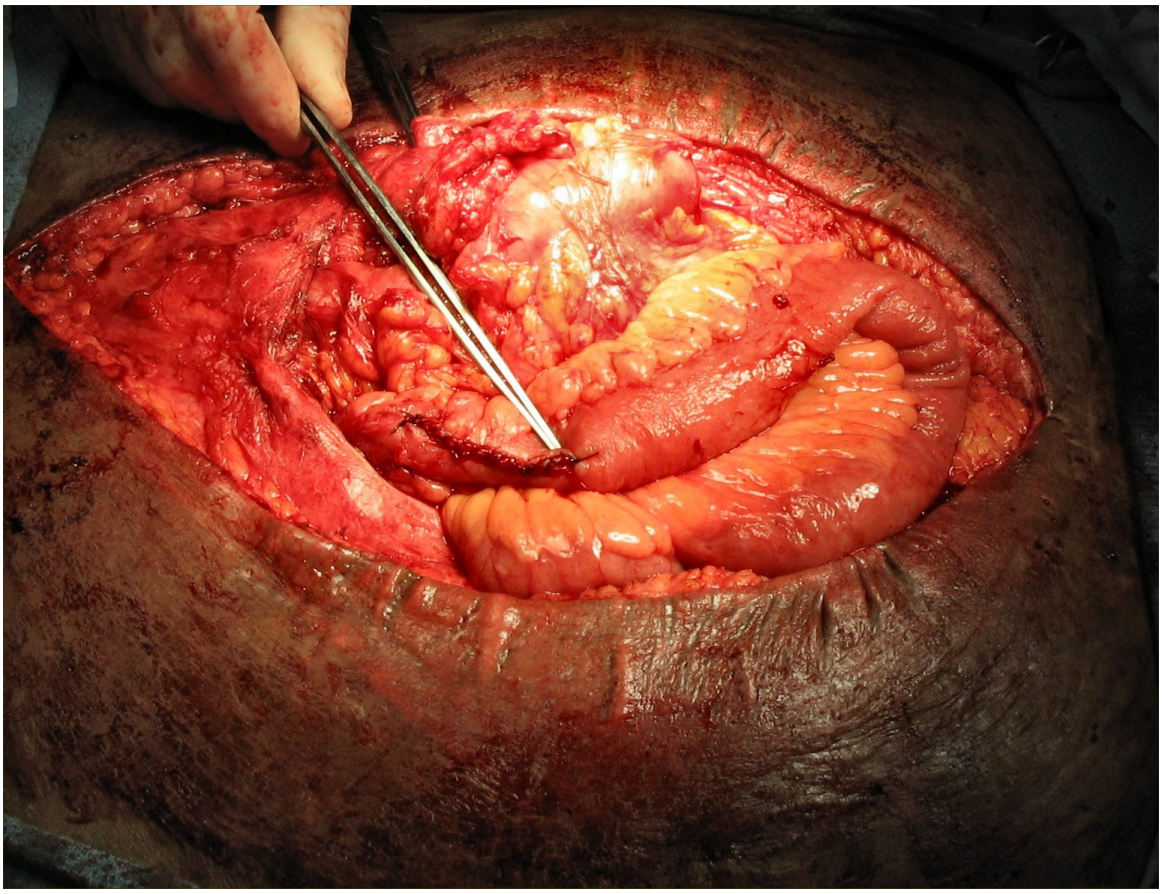
C. LATERAL FISTULA WITH DISTAL OBSTRUCTION

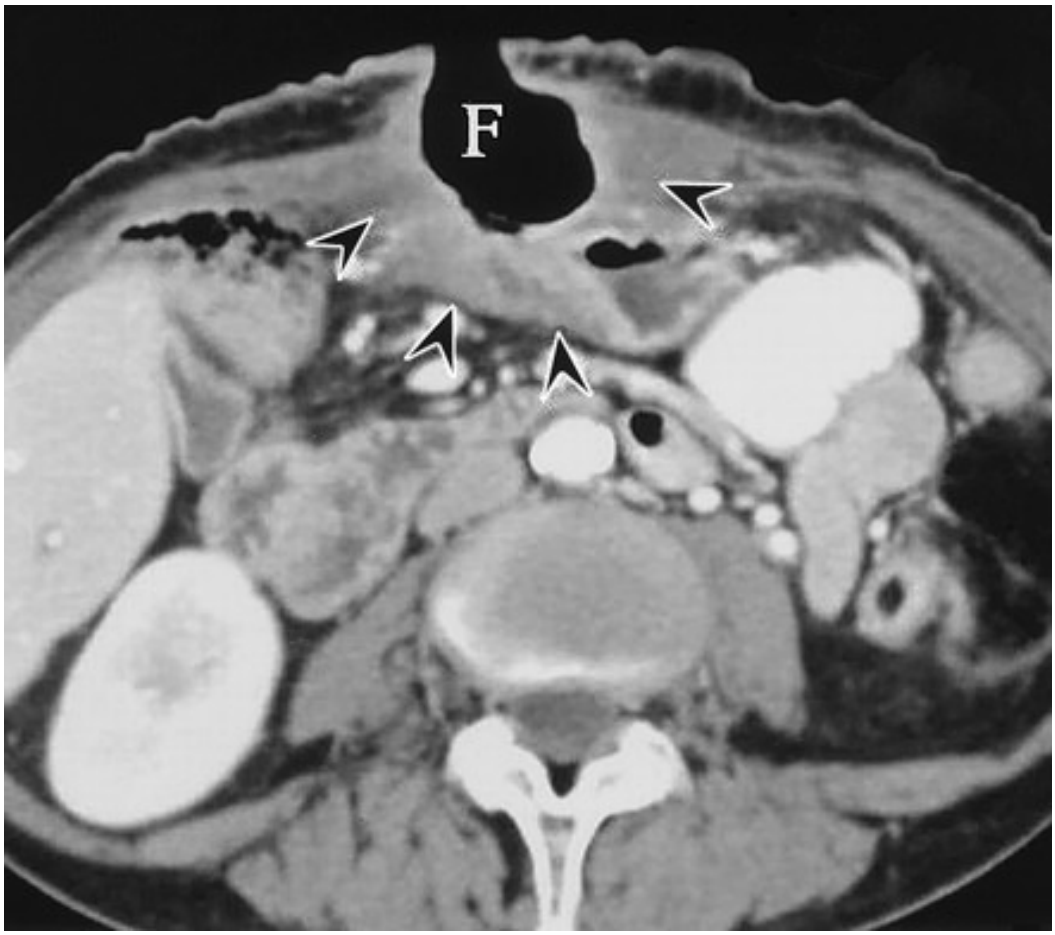


D. FISTULA IN STRICTURED INTESTINE.



DIAGRAMATIC REPRESENTATION OF ENTEROCUTANEOUS FISTULA

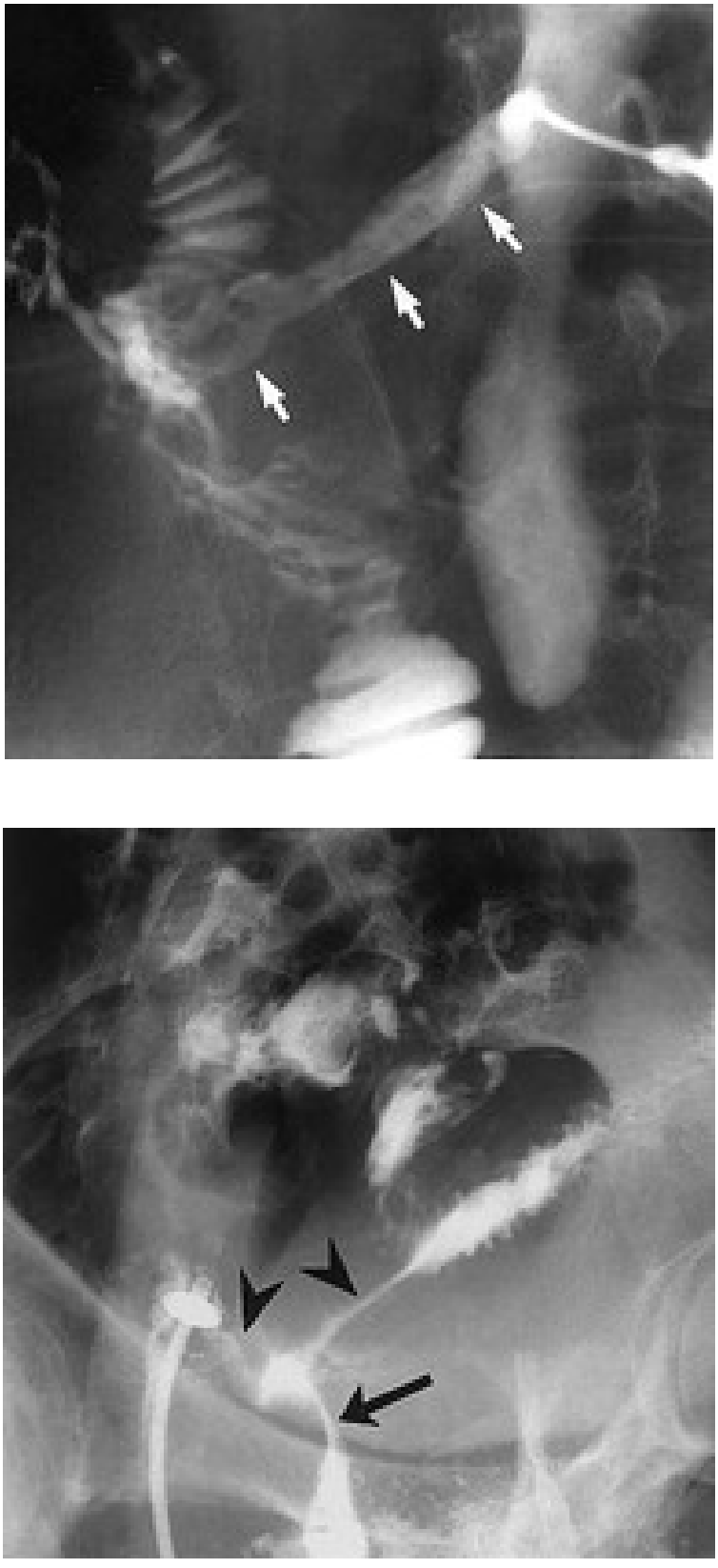




CT IMAGE OF ENTEROCUTANEOUS FISTULA

ENTEROCUTANEOUS FISTULA IN A APPENDICECTOMY SCAR

SMALL BOWEL FISTULA



FISTULOGRAM - ENTEROCUTANEOUS FISTULA